

**Week in Review—Additional Material sections 8.5 and 8.6**

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**Section 8.5: The Normal Distribution**

- continuous probability distribution.
  - probability density function
    - $f(x) \geq 0$  for values of  $x$
    - area under the curve is 1
- normal distribution(bell curve)
  - standard normal curve
    - variable= $Z$
    - $\mu = 0$
    - $\sigma = 1$
  - To convert values of any normal curve,  $X$ , with mean  $\mu$  and  $\sigma$  to  $Z$ -values use  $z = \frac{x-\mu}{\sigma}$
- calculator commands
  - normalcdf(left cutoff, right cutoff,  $\mu$ ,  $\sigma$ )
  - invNorm(area,  $\mu$ ,  $\sigma$ )

1. Compute the following

(a)  $P(0.3 < Z < 1.83) =$

(b)  $P(Z < 1.5) =$

(c)  $P(Z = 1.25) =$

2. Find the values of  $A$  and  $B$  for the following.

(a)  $P(Z < A) = .68$

(b)  $P(-B < Z < B) = .48$

3. The normally distributed random variable  $X$  has a value of 38. Find the corresponding  $z$ -value if the random variable  $X$  has a mean of 43 and a standard deviation of 4.

4. The random variable  $X$  is normally distributed with a mean of 83 and a standard deviation of 5. Find the percent of the area under the normal curve that is below 1.3 standard deviations above the mean.

5. Suppose  $X$  is a normal random variable with  $\mu = 40$  and  $\sigma = 8$ .

(a)  $P(32 < X < 53) =$

(b)  $P(X > 45) =$

(c) Find the value of  $A$  such that  $P(X > A) = .75$

**Section 8.6: Applications of the Normal Distribution**

- Normal Random variables word problems for section 8.5
  - Approximating the Binomial Distribution
    - There are two styles of the approximating. USE THE STYLE TAUGHT BY YOUR INSTRUCTOR. See the answers/videos for the different styles.
6. The tread life of a tire is normally distributed with a mean of 40,000 miles and a standard deviation of 2000 miles.
- (a) What is the probability that a tire selected at random will have a tread life of more than 35,000 miles?
  - (b) In a group what 800 tires, approximately how many of them will last more than 35,000 miles.
  - (c) What is the probability that a tire selected at random will have a tread life between 38,000 miles and 44,000 miles?
  - (d) If 4 tires are installed in a car and experience even wear, determine the probability that all 4 tires will have a tread life between 38,000 miles and 44,000 miles.
  - (e) If 4 tires are installed in a car and experience even wear, determine the probability that exactly 3 tires will have a tread life between 38,000 miles and 44,000 miles.
7. The amount of cheese on a pizza is normally distributed with an average of 8 oz and a standard deviation of 0.5 oz.
- (a) What is the probability that a pizza selected at random will have less than 7.2 oz of cheese?
  - (b) Out of 300 pizzas, approximately how many of them will have less than 7.2 oz of cheese?
8. If 20% of the bolts manufactured by a machine are defective, use a normal curve to find the probability that less than 750 of the 4000 bolts made will be defective.
9. A bank estimates that 3% of its loans will be delinquent. Use a normal curve to approximate the probability that of its 5000 loans
- (a) at least 115 and at most 180 will be delinquent.
  - (b) more than 140 loans will be delinquent.